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5 Description of the Proposed Scheme

5.1 Introduction

This chapter provides a detailed description of the proposed Glenamuck District Roads Scheme (GDRS), ancillary drainage and landscape works. The construction methodology employed for the proposed scheme is outlined thereafter. Overall policy and scheme objectives are set out at Chapter 2 of this EIAR.

5.2 The Proposed Scheme

An overview layout drawing of the proposed Glenamuck District Roads Scheme is shown in Figure 5-1. Detailed drawings are included within Volume 3.

The Glenamuck District Distributor Road (GDDR) connects from the Enniskerry Road adjacent to De La Salle Palmerstown Rugby Club to a tie in at the Glenamuck Road East/Golf Lane Roundabout. The Glenamuck Link Distributor Road (GLDR) connects from the approximate midpoint of the GDDR to the Enniskerry Road south of Kiltiernan and will connect the new distributor road with the existing Glenamuck Road, Ballycorus Road and Barnaslingan Lane providing an alternative to the Enniskerry Road for north-south travel.

The Glenamuck District Distributor Road has a total length of approximately 1.5km. The road consists of approx. 660 m of two lane single carriageway from the Enniskerry Road tie in to the GDDR / GLDR junction and approx. 890 m of four lane dual carriageway from this junction to the Golf Lane Roundabout. The Glenamuck Link Distributor Road consists of approximately 1.8km of predominantly two-lane single carriageway road. Both roads have additional turning lanes as required at junctions along the route.

The location of the proposed GDRS is to the east of the R117 and southwest of the M50 Motorway, between Carrickmines and Kiltiernan in the central part of Dún Laoghaire-Rathdown County Council area. This rural location is situated at the urban fringes of Dublin City and County with access onto the M50 motorway, which provides linkages to the majority of the national road schemes in the country. The proposed roads scheme will link with the existing road network. New junctions to be formed include

- GLDR & R117 (Enniskerry Road South) – Enniskerry Road to be diverted onto the GLDR at this location with bus-gated connection and pedestrian/cycle connections to the existing road route to Kiltiernan Village
- GLDR & Barnaslingan Lane – Barnaslingan Lane to terminate at GLDR at new 3 arm junction. All turning movements accommodated. Short section of Barnaslingan lane to be Cul de saced between GLDR and Enniskerry Road
- GLDR & R116 (Ballycorus Road) – New 4 arm Junction with turning lanes. All turning movements accommodated.
- GLDR & Glenamuck Road. New 4 arm junction with turning lanes. Vehicle movements between GLDR and Glenamuck Road East of the GLDR to be bus-gated. A small roundabout has been

provided to accommodate turning movements for vehicles reaching the end of the Bus-gated section of the Glenamuck Road

- GDDR & GLDR – New 3 arm Junction with turning lanes. All turning movements accommodated.
- GDDR & Glenamuck Road at Golf Lane Roundabout. Additional arm to be added to existing roundabout
- GDDR & Enniskerry Road (North)-Enniskerry Road to be diverted onto the GLDR at this location. New three arm junction with turning lanes. All turning movements accommodated.

The proposed scheme will also include:

- Surface water drainage including a number of significant attenuation ponds
- Public lighting
- Traffic signals
- Road marking and signage
- Diversion of existing utilities and provision of new utilities
- Accommodation works to existing properties
- Walls, retaining walls, fencing and other boundary treatments
- Associated landscaping works
- Miscellaneous ancillary works

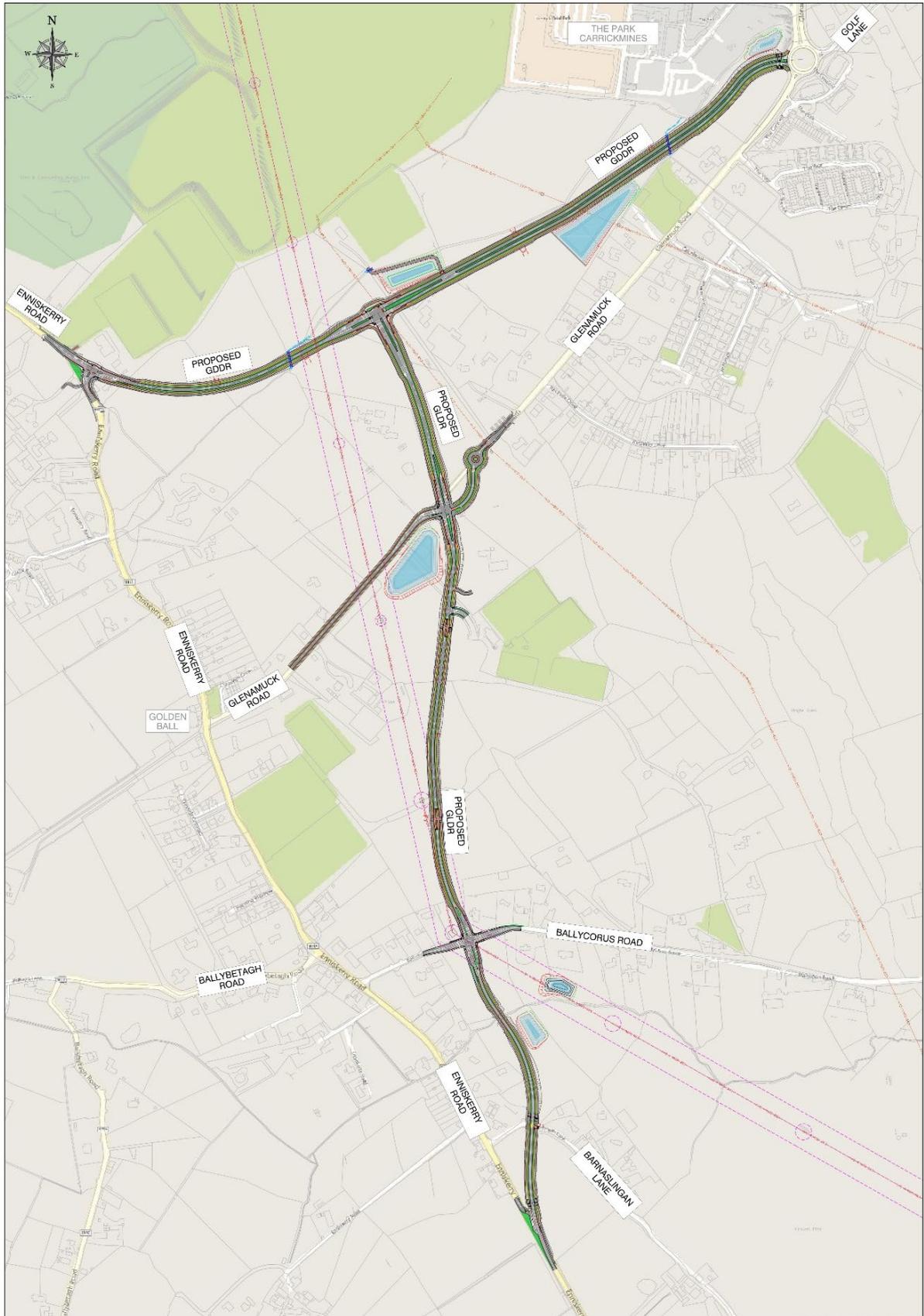


Figure 5-1: Overview Layout

5.2.1 Design Standards

The following key guidance documents have been used to set design criteria for the Scheme design.

- Design Manual for Urban Roads & Streets (DMURS) - Department of the Environment Community and Local Government / Department of Transport Tourism and Sport
- Design Manual for Roads and Bridges (DMRB) – *Transport Infrastructure Ireland*,
 - [DN-GEO-03031] - Rural Road Link Design
 - [DN-GEO-03044] - The Geometric Layout of Signal Controlled Junctions and Signalised Roundabouts
 - [DN-GEO-03060] - Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions)
- National Cycle Manual – National Transport Authority
- Greater Dublin Strategic Drainage Study [GSDSDS]
- Taking in Charge Policy Guidance Document, Dún Laoghaire-Rathdown County Council - 2011
- The SuDS Manual (c753), CIRIA - 2015
- DLRCC – Public Lighting Installations in Residential & Industrial Areas

It should be noted that the design as outlined in this report will be subject to alteration and enhancement as the proposed scheme is progressed through subsequent phases of development.

5.2.2 Road Hierarchy

Best practice guidance relating to the design of urban roads and streets is contained in the Design Manual for Urban Roads and Streets (DMURS). DMURS sets out a road hierarchy of Arterial, Link & Local Streets. This hierarchy is set out relative to other relevant documents in Figure 5-2 below.

DMURS Description	Roads Act/NRA DMRB	Traffic Management Guidelines	National Cycle Manual
Arterial	National	Primary Distributor Roads	Distributor
Link	Regional (see note 1)	District Distributor Local Collector (see Notes 1 and 2)	Local Collector
Local	Local	Access	Access

Notes

Note 1: Larger Regional/District Distributors may fall into the category of Arterial where they are the main links between major centres (i.e. towns) or have an orbital function.

Note 2: Local Distributors may fall into the category of Local street where they are relatively short in length and simply link a neighbourhood to the broader street network.

Figure 5-2: DMURS Street Hierarchy (DMURS)

The proposed GDDR & GLDR are considered Link Streets in line with the hierarchy above.

5.2.3 Urban Design Integration

It is noted that the surrounding zoning and land usage varies over the length of the road route. It is therefore important the road design reflects the characteristics of the surrounding land and facilitates effective integration with existing and future developments in line with DMURS guidance.

It is also acknowledged that the road is being designed and delivered in isolation as an infrastructural project and the designers have no control over the phasing, layout, frontage or future boundary treatments of surrounding private developments.

In order to ensure that the road design does not preclude the implementation of high quality urban design in the area, an urban design exercise has been carried out to support the road scheme design and is documented in the “GDRS Urban Design Report” which is included in Appendix 12.4.

The analysis has resulted in variations in road cross sections, landscaping, and junction arrangement over the scheme to respond the surrounding characteristics and development types and better address pedestrian and cyclist integration with the road layout. A summary of cross sections is presented in Section 5.2.9.

5.2.4 Traffic Flows

The road cross sections, pavement build-up, junction layout, traffic signals and other design elements have been informed by the predicted traffic flows. A detailed transport modelling exercise has been undertaken to establish these flows. The modelling methodology and resultant forecasted demand are detailed separately within Chapter 7 – Traffic and Transportation and associated appendices.

5.2.5 Design Speed

The proposed design speed for new roads is to be 50 km/hr.

5.2.6 Carriageway Widths

DMURS recommends a standard lane width of 3.25m for Link Streets. This has been applied as the standard for all single carriageway sections of the GDDR & GLDR.

The minimum lane width to be applied to new carriageway surfaces shall be 3.0m. Lane widths of 3.0m will be applied at junctions and along any sections of dual carriageway.

It is noted that there are a variety of cross sections proposed along the road routes as set out in the Urban Design Document. In addition the road cross section changes at all junctions to accommodate the required turning lanes, pedestrian and cyclist facilities and traffic signals. A commentary on the proposed cross sections is included in Section 5.2.9.

5.2.7 Parking Provision

The provision of on street parking at suitable locations is recommended in DMURS. The GDRS Urban Design Report has identified a number of locations along the road route where parking provision would be suitable with regard to surrounding land use/zoning. All spaces proposed are parallel parking and are to have standard size of 2.4m (W) x 6m (L). Minimum size is to be 2.1m (W) x 6m (L)

In line with DMURS guidance parking shall be split into banks which will be separated by kerb build-outs (typically containing a street tree or street light).

Where parking is proposed adjacent to cycle paths a minimum buffer space of 0.75m is to be provided between the parking and the edge of the cycle path to prevent potential impacts between car doors and cyclists.

In many cases the proposed parking will not be required in the current rural setting but may be appropriate in conjunction with future street frontage developments. In these cases, the roadside verge will be sized to accommodate the provision of parking/buffer at a future stage. Parking is to be provided along a section of the GLDR alongside the open space/amenity zoning area south of Glenamuck Road. This parking will offset the loss of parking along the existing Wayside Celtic access road and will provide parking provision for use of any future parks/amenity area.

5.2.8 Pedestrian and Cyclist Infrastructure

A key aim of the scheme is to improve provisions for cyclists, pedestrians and other vulnerable road users. Generous path and cycle track widths are to be provided to encourage and maximise sustainable transport. The requirements for pedestrians and cyclist have been considered from the outset for all junction designs.

Best practice guidance from the National Cycle Manual has been implemented on the scheme including

- Determination of minimum cycle track widths based on edge conditions and route features in accordance with the width calculator
- Provision of segregated cycle tracks along the majority of the route

- Provision of Advance Stacking Locations, Box Turn Markings, Turning Pockets and Push button units for cyclists
- Provision of ramped transitions from on-road cycle lanes to segregated cycle tracks
- Provision of on-road cycle infrastructure and markings through junctions and alternative shared surface routes with toucan crossings for less confident cyclists

The design standard width for footpaths is 2.0m with a minimum of 1.8m provided at constrained locations

The design standard width for cycle tracks/cycle lanes is 2.0m which is applied to all new cycle infrastructure along the GDDR & GLDR. Cycle lane width along realigned road approaches will be in accordance with the National Cycle Manual.

It is noted that no cyclist infrastructure is in place along the majority of adjoining exiting roads, in such cases cycle provision is to be provided on the realigned roads in the vicinity of the junction only before road cross sections transition to match existing conditions

5.2.9 Road Cross Sections

As detailed in the Urban Design Report a variety of road cross sections are applied over the length of the scheme to ensure the street responds to the surrounding land use and environment. A schematic of the cross sections applied is presented in Figure 5-3.

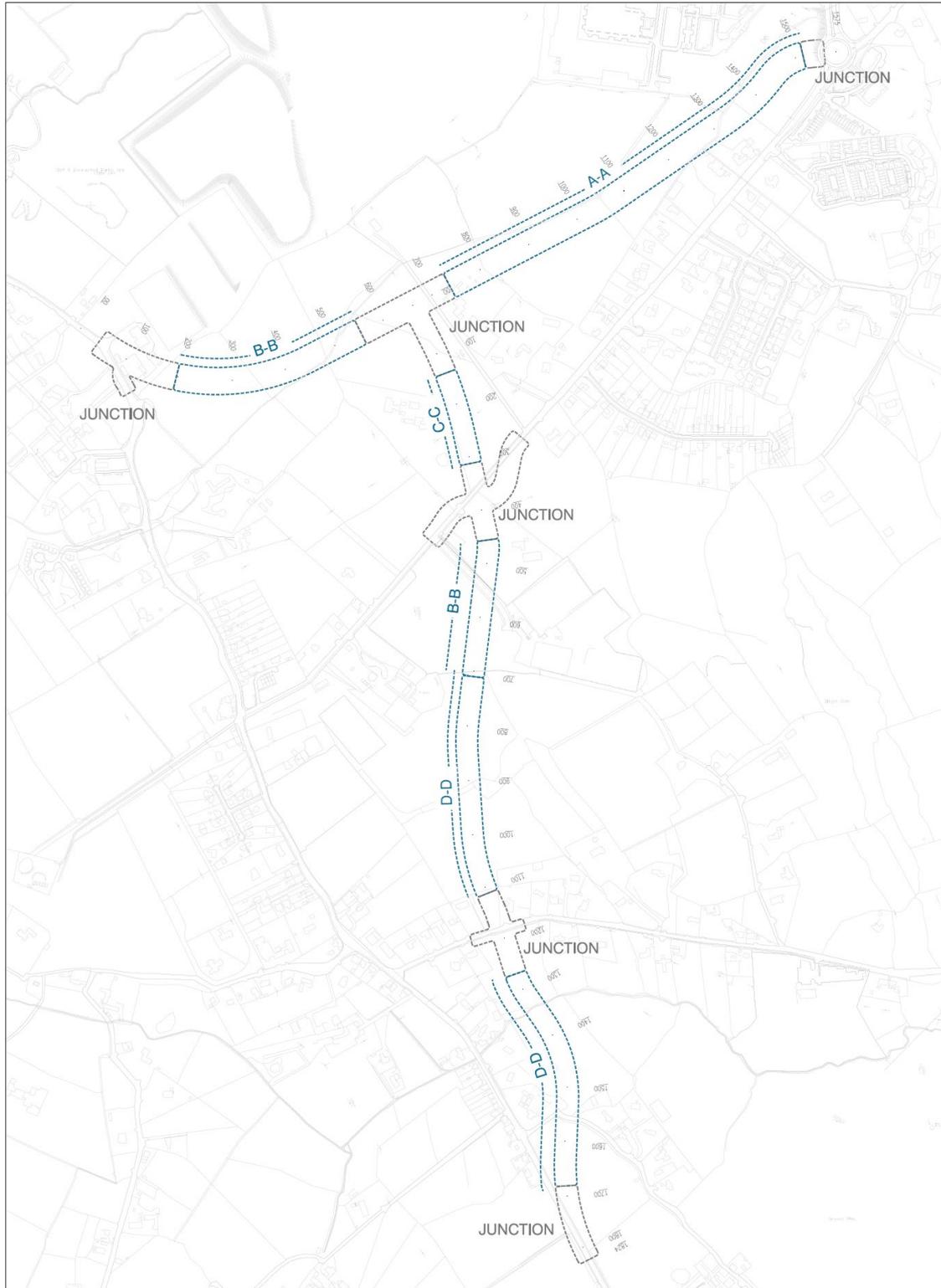


Figure 5-3: Schematic Road Cross Sections Applied

Section A-A	
Urban Design Reference	Eastern Gateway
Approx Areas Applied	GDDR - STA 730 – STA 1520
Carriageway Elements	<ul style="list-style-type: none"> • 3.0m – Central Boulevard • 2 x 3.0m Lanes – Both Directions • 2.0m Verge – North Side • 3.15m Verge – South Side [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Directions
Variations	<ul style="list-style-type: none"> • RHS Verge reduced to 1.35m adjacent to pond as parking demand will be reduced and significant landscaping will be present adjacent to road edge

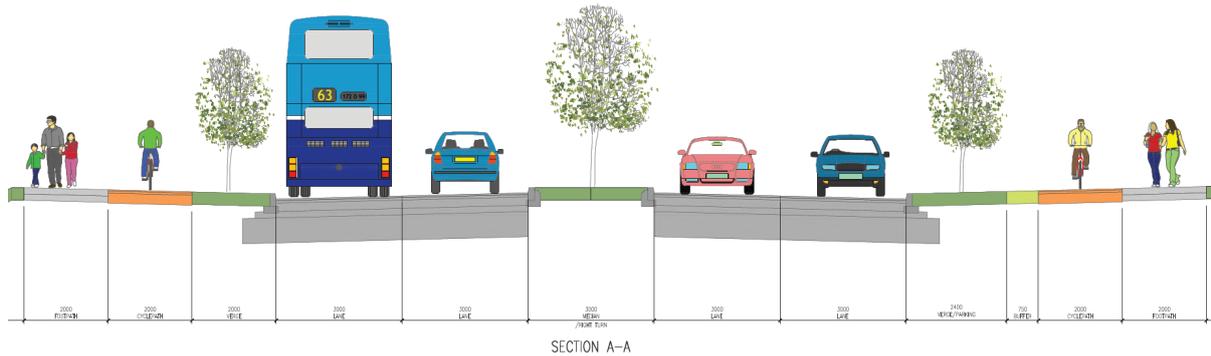


Figure 5-4: Section A-A Schematic

Section B-B	
Urban Design Reference	Western Gateway, Central Gateway
Approx Areas Applied	GDDR - STA 200 – STA 550 GLDR - STA 450 – STA 700
Carriageway Elements	<ul style="list-style-type: none"> • 3.25m Lanes – Both Directions • 3.15m Verge – Both Sides [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	<ul style="list-style-type: none"> • A raised table pedestrian crossing is provided (GLDR approx. STA 600). Crossing includes central vegetated island. • On GLDR section parking will be constructed at initial construction stage. On GDDR this will be development driven

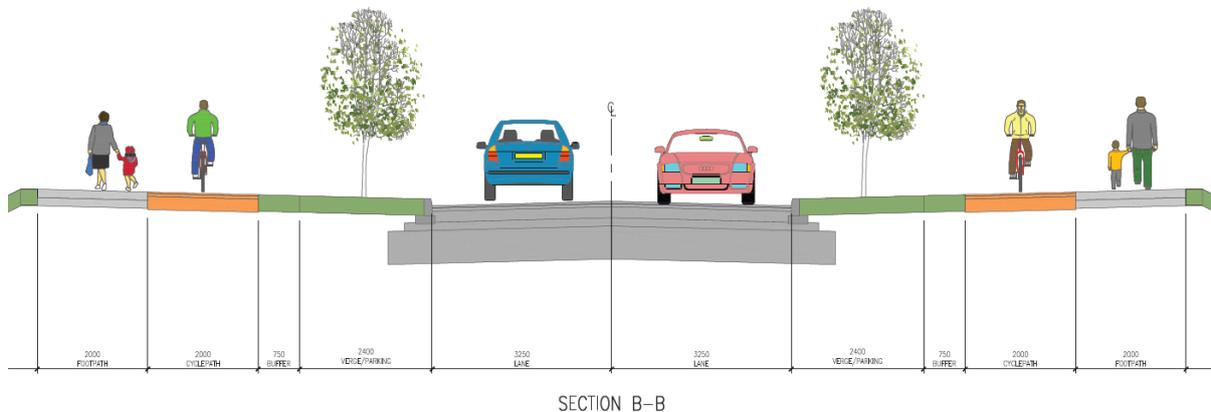
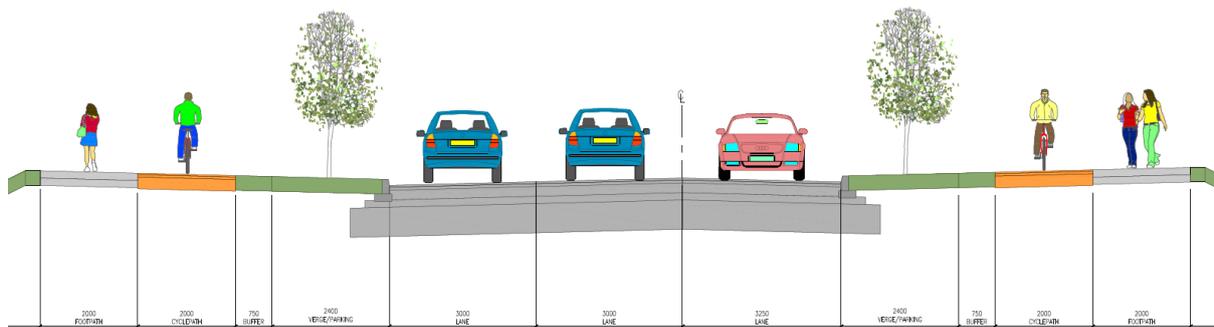


Figure 5-5: Section B-B Schematic

Section C-C	
Urban Design Reference	Western Gateway, Central Gateway
Approx Areas Applied	GLDR - STA 140 – STA 310
Carriageway Elements	<ul style="list-style-type: none"> • 3.25m Lane – South Bound • 2 x 3.0m Lane - Northbound • 3.15m Verge – RHS & LHS [Provision for future 2.4m parking plus 0.75m Buffer to cycle track] • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	



SECTION C-C

Figure 5-6: Section C-C Schematic

Section D-D	
Urban Design Reference	Southern Gateway, Central Gateway
Approx Areas Applied	GLDR - STA 700 – STA 1150 GLDR - STA 1250 – STA 1700
Carriageway Elements	<ul style="list-style-type: none"> • 3.25m Lanes – Both Directions • 2.2m Verge – Both Sides • 2m Segregated Cycle Track – Both Directions • 2m Footpath – Both Sides
Variations	<ul style="list-style-type: none"> • A raised table pedestrian crossing is provided (approx. STA 950). Crossing includes central vegetated island. • Verge omitted along proposed Loughlinstown River bridge to minimise bridge width

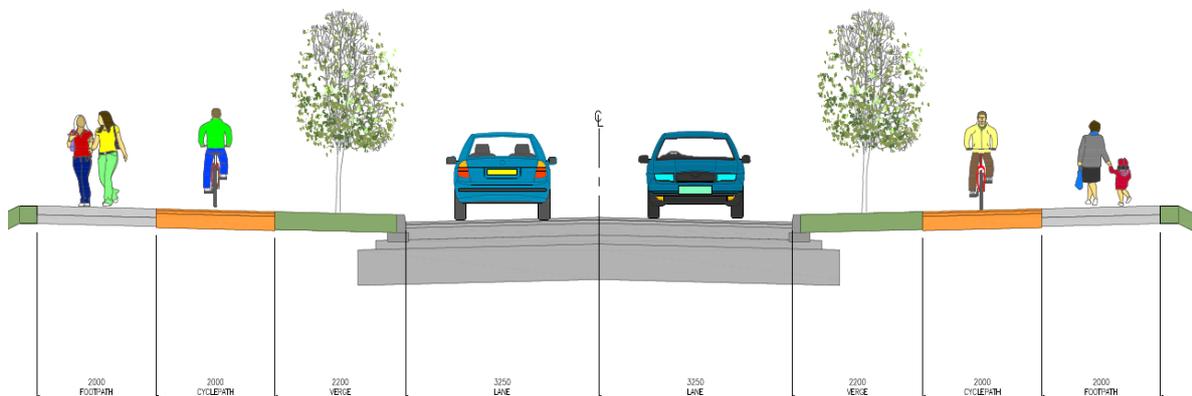


Figure 5-7: Section D-D Schematic

5.2.10 Public Transport Provision

The road design facilitates all existing public transport routes continuing in their current arrangement. Consultation has been carried out with Dublin Bus to ensure the road design incorporates any current or future requirements which have been identified.

The scheme also incorporates “bus-gates” at the GLDR / Enniskerry Road junction and on the east arm of the GLDR / Glenamuck Road.

In order to achieve a good ‘modal share’ for public transport and walking /cycling in the LAP area, appropriate priority measures at junctions are necessary. Connectivity with the Luas Green Line offers a high quality public transport option linking with major employment centres such as Sandyford and Cherrywood as well as the City Centre. In order to achieve a high quality bus feeder service to the Luas, a level of priority in the local road network for bus users is required. The bus gates also prevent high levels of through traffic on the Enniskerry Road through Kiltiernan and along the eastern section of the Glenamuck Road and will have significant traffic calming effects on Glenamuck Road East and in Kiltiernan Village with corresponding decreases in air and noise pollution. The bus gates are considered to be a critical traffic management provision necessary when the zoned lands have developed. Significant planning /construction activity is currently underway in the area and significant increases are likely to follow closely following the road construction.

The bus gates are intended to be implemented by signage, lanes, traffic signals and road markings and are not intended to include physical barriers. Physical barriers require significant and ongoing technical integration with public & private bus operators, can cause accidents due to driver error or equipment malfunction and require ongoing maintenance.

In order to integrate with the proposed traffic signals, lane and junction arrangements, and to effectively influence driver behaviour in the area the bus gates will be required to operate at all times. It is noted that all bus gates facilitate pedestrian and cycle movement and affect vehicular movement only. In all cases alternative vehicle routes are maintained.

5.2.11 Junctions

Refer to the traffic modelling report in Appendix 7-1 for detailed information on Junction layouts and capacities.

5.2.12 Structures

The Roads Scheme incorporates 4 watercourse crossing structures. Crossings of the Glenamuck Stream and minor watercourse are intended to be concrete box culverts and a crossing of the Loughlinstown /Shanganagh River is intended to be a bridge. Details of watercourse crossing (WX) structures are detailed in Chapter 14 – Water and Hydrology

5.2.13 Earthworks and Pavement

The proposed scheme has been designed to minimise earthworks by matching design elevations to existing levels where possible. Preliminary quantities have been determined and are set out in Chapter 13 - Land and Soils.

Pavement & Foundation Design will be in accordance with DMRB guidance contained in DN-PAV-03021

5.2.14 Scheme Lighting

For the safety and convenience of vehicular road users, pedestrian and cyclists; road lighting will be provided along the proposed route. The standard of lighting will be in accordance DLRCC's 'Public Lighting Installations in Residential and Industrial Areas - Guidance Document - February 2017'. Additional guidance will be taken from British Standards BS5489 & EN13201-2015 - Road Lighting & C.I.E. 115-2010 Recommendations for the Lighting of Roads for Motor and Pedestrian Traffic. Where necessary the existing public lighting will be upgraded at junctions with existing roads.

5.2.15 Traffic Signs

Scheme signage will be provided to ensure that clear directional and regulatory messages are transmitted to drivers and other road users. The design of signage will be based on the Traffic Signs manual issued by the Department of the Environment, the legal framework for which is contained in the Roads Traffic Act.

5.2.16 Utilities

The infrastructure of a number of service providers is likely to be impacted by the Glenamuck District Roads Scheme. The provision of the proposed scheme shall ensure that there are no permanent disruptions to services provided by these bodies and that all temporary disruptions must be kept to a minimum. Any diversions or modifications to existing infrastructure will be agreed with the relevant provider and will be completed in line with their procedures and code of practices

The following statutory bodies and service providers were consulted to identify interfaces between their service and the proposed road development.

- Dun Laoghaire Rathdown County Council
- Irish Water
- Electricity Supply Board (ESB)
- Gas Networks Ireland
- Eir
- Virgin Media

Utility providers will also be notified of the proposed works and offered the opportunity to incorporate new strategic infrastructure into the new road construction.

5.2.17 Irish Water

Provision of new strategic foul and potable water infrastructure within the new roads will be determined by Irish Water. DLRCC have nominated the area as a network extension project and Irish Water have engaged a consultant to complete a preliminary design for the area.

5.2.18 High Voltage ESB Lines

There is significant high voltage ESB infrastructure in the vicinity of the road scheme. This consists of the Arklow - Carrickmines 220kV Double Circuit Route and the Carrickmines - Fassaroe 110 kV line.

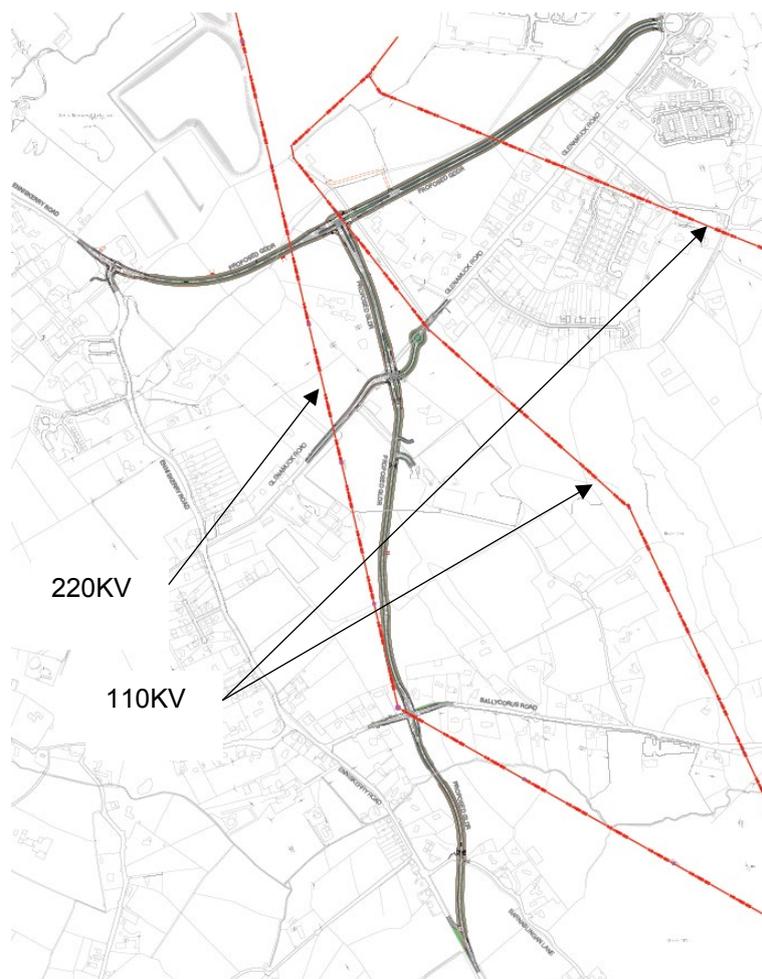


Figure 5-8: HV ESB Overhead Lines

Objective EI13 of the LAP states a desire to underground high voltage transmission lines in the area. Eirgrid (Transmission System Operator) have confirmed that undergrounding of the 220KV line is technically infeasible and only overhead diversions would be considered.

Diversion of the 220KV line at Ballycorus Road was proposed as part of the original scope of the roads scheme. This would require the addition of at least two new 220KV angle pylons and would result in significant cost and visual impact as well as serious disruption to the regional electrical transmission network.

A solution has been developed which delivers the road while maintaining the existing pylons in place. This is subject to final agreement with Eirgrid (Transmission System Operator), ESNB (Transmission Asset Owner) and ESBI (Consultant to Eirgrid and ESNB) however it has been confirmed that the preliminary design is acceptable.

The feasibility of undergrounding 110KV in the vicinity of the scheme has been explored with relevant stakeholders. It has been confirmed that current policy is for undergrounding of 110KV infrastructure to commence or terminate at a substation. The closest substation is located on the Ballyogan Road approximately 1.2km west of the scheme extents. The lines cannot therefore be undergrounded as

part of the current scheme. It is intended that DLRCC will lay underground ductwork along the scheme which would facilitate the future undergrounding of the line(s) along the route of the proposed roads.

5.2.19 Land and Property Considerations

Land Acquisition

The provision of the Glenamuck District Roads Scheme requires the acquisition of land for the construction and operation of the asset. DLRCC and DBFL undertook a series of meetings with affected landowners and the general public during the design phase. Requests/suggestions were evaluated and included where they were deemed possible and beneficial to the scheme. The area of land required has been determined by a number of related parameters, including:

- Road construction & earthworks cuttings/embankments
- Pedestrian and cycling facilities
- Structures and channel diversions
- Surface Water Attenuation
- Landscaping and boundary treatments
- Working Space for construction
- Construction materials & soil storage requirements
- Acquisition of severed plots

In addition to the permanent land requirements for the operational scheme there is a requirement for an additional temporary landtake beyond the permanent road extents to facilitate construction, plant movements, construction compounds, spoil and material storage, landscaping and other works. This land will be temporarily acquired for the duration of construction and then reinstated and returned to the use of the relevant landowner on completion of construction works.

In general all lands which will contain permanent infrastructure associated with the road (pavements, embankment/cutting slopes, drainage/attenuation) will be permanently acquired. Through consultation with affected landowners DLRCC have identified that a number of landowners wish to minimize the land take to better facilitate the integration of land use or future developments with the proposed streets. Within these landholdings the permanent land take line will be at the back of footpath. Lands affected by earthworks slopes or drainage which extend beyond this will only temporarily acquired and will revert to the relevant landowner on completion of works. This will allow the landowners to better incorporate future frontage developments or landscape treatments into the streetscape.

The approximate areas to be acquired as part of works is detailed below in Table 5-1. These values include lands which are already occupied by public roads and lands already owned by DLRCC.

Table 5-1 Land Acquisition

Permanent Land Acquisition	Temporary Land Acquisition
14.6 ha	7.4 ha

5.2.20 Existing Accesses & Accommodation Works

Where an existing access is affected by the proposed road it will be modified to suit the road proposals or replaced with a suitable alternative. Accesses affected which require significant works are set out in the table below.

Table 5-2 Access Works

Location	Description	Proposal
Enniskerry Road N Approx CH 35	Existing Residential Driveway incompatible with new junction layout	Replacement driveway to be provided from Enniskerry Road N tying in to existing
Glenamuck Road E Approx CH 170	Access to Bective Ranger Sports Grounds. Existing lane access from Glenamuck Road severed by GDDR	Replacement access from GDDR tying in to existing.
Glenamuck Road W Approx CH 10	Access to DLRCO traveller accommodation. Existing road access from Glenamuck Road severed by GLDR	Replacement access from GLDR tying in to existing.
Glenamuck Road W Approx CH 110	Access to Wayside Celtic Sport grounds. Existing road access from Glenamuck Road severed by GLDR	Replacement access from GLDR tying in to existing.

A number of other accesses or existing boundary treatments along existing roads may require minor works to the access or boundaries as a result of road widening. These works will be completed to replicate the existing conditions as far as is practicable and will be agreed with affected landowners as accommodation works. A more detailed assessment of accommodation works required is presented in Chapter 17.

Accesses will be provided to all land parcels which are segregated by the road. These will take the form of field accesses generally per NRA SCD-02754. Exact locations of field accesses will be determined in conjunction with the affected landowners with due regard to engineering constraints.

5.2.21 Future Accesses

A number of future accesses are shown indicatively on the scheme drawings for context. These represent conceptual access points to the road from future development on the adjacent zoned lands. All accesses to future developments will be required to secure all relevant statutory and planning permissions and may differ from those shown depending on the final layouts of future developments.

5.2.22 Structures Affected

No permanent structures or residential structures are proposed to be demolished by the proposed scheme. There are existing temporary educational cabin structures within the De La Salle Rugby club grounds which will require relocation and a small timber agricultural shed adjacent to Barnaslingan Lane will also need to be relocated.

5.2.23 Boundary Treatments

A preliminary indication of boundary treatments is included within preliminary landscape designs in Volume 3. Final boundary treatments will be determined at detailed design stage in conjunction with

affected landowners. It is anticipated that boundary treatment will take the form of fences, hedgerows or walls.

5.2.24 Surface Water Drainage Design

Sections 5.2.24 to 5.2.29 should be reviewed in conjunction with Chapter 14 Water & Hydrology. Surface Water drainage design will be further developed at detailed design phase.

5.2.25 Surface Water Network

A new surface water network will be constructed to collect and convey all runoff from the proposed project to suitable discharge points. The proposed road scheme lies entirely within the catchment of the Loughlinstown River (Also known as the Shanganagh River). There will be a number of surface water outfalls from the proposed road drainage network to the Loughlinstown River and its tributaries in the area.

Prior to each discharge point from the road drainage network a flow control (Hydrobrake or similar) will be installed to limit the discharge to the watercourse to 2l/s per hectare of contributing catchment.

Attenuation storage will be provided upstream of each hydrobrake. This will generally take the form of open ponds. Design considerations for ponds are presented in Section 5.2.29. Indicative drainage infrastructure is shown in Volume 3 Figure 14.6

5.2.26 Existing Drainage

Existing drainage networks affected by the road construction will be diverted around/through the road corridor or will be incorporated into the road drainage network as appropriate. No road runoff will be discharged to existing networks without attenuation to a rate of 2l/s/ha.

Where the road corridor intercepts drainage flow paths from upslope agricultural lands interception drainage will need to be provided. It is anticipated that this drainage will take the form of filter drains generally per NRA SCD/500/20. The filter drains will discharge to existing watercourses or into the road drainage network as appropriate. These drains may become redundant where upslope development occurs. Interception drainage intakes would not generally be considered suitable as discharge points for future developments.

5.2.27 Contributing Catchment

In addition to receiving flows from the proposed road, it is anticipated that the road drainage network will receive flow from some additional lands within the LAP once they are developed/redeveloped. An analysis has been carried out to determine the lands outside the road extents which it is anticipated will drain to the road network. These will be referred to as "External Lands" within this report. DLRCC have indicated that all future developments discharging to the road drainage network will have to provide on-site flow control and attenuation in line with GSDSDS requirements prior to discharge to the road drainage network. The ponds will therefore provide primary attenuation for the road and will serve as secondary/regional attenuation for the external lands

The key factors considered when determining the contributing catchments were;

- Topography
- Land Ownership Parcels & access from parcel to potential discharge points

- Available Planning documentation
- Consultation with Landowners/Developers

5.2.28 Attenuation Volumes

Runoff rates from the new paved road surfaces will exceed the 2l/s/ha restricted outflow, in addition it is likely that restricted outflows from connected development lands will be a greenfield rate which exceeds 2l/s/ha (4.5l/s/ha assumed for preliminary design as directed by DLRCC). Therefore the incoming flow will exceed the allowable outflow and a storage volume will be required to accommodate the retained water volumes. The ponds are designed to accommodate the 1 in 100 year storm event volume. The required attenuation volumes in the pond are determined from drainage modeling software.

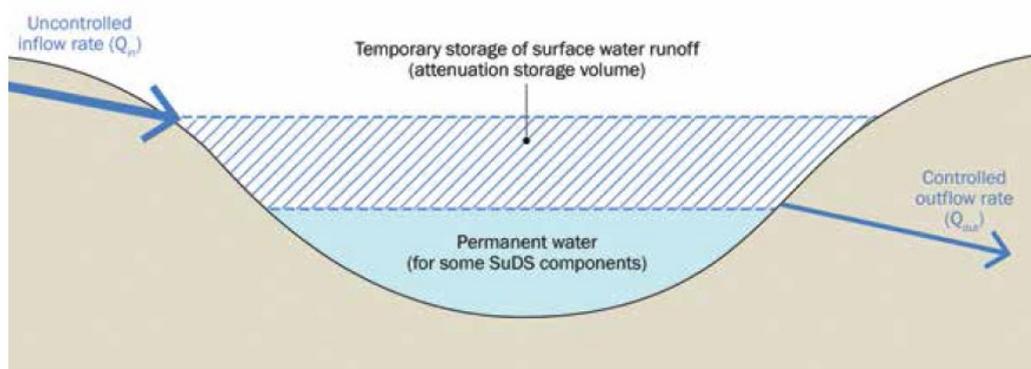


Figure 5-9: Attenuation Storage (The SuDS Manual)

5.2.29 Pond Design

The implementation of Regional Attenuation Storage is recommended in the SuDS Manual and The GSDS and forms an effective part of a Suds Management Train for the area.

In particular the provision of ponds is encouraged as it provides both attenuation and treatment of the runoff. Ponds can also provide amenity value and encourage biodiversity. The provision of well-designed ponds can achieve the four pillars of SuDS design as set out in the Suds Manual.

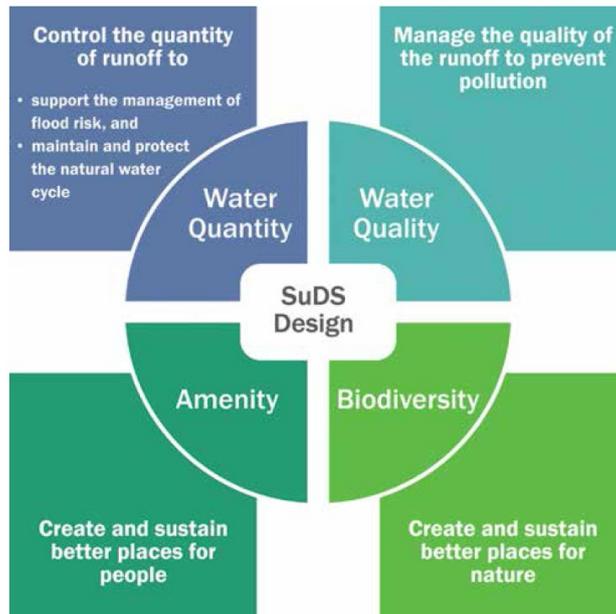


Figure 5-10: Four Pillars of SuDS Design (The SuDS Manual)

The pond bank profiles have been carefully designed in order to maximise the safety, amenity & biodiversity of the ponds. To minimise safety and accessibility issues and to increase habitat potential the pond banks will be required to be reasonably shallow slopes and be broken up with a variety of habitat, safety and maintenance benches. A typical pond bank profile which has been created in general accordance with the requirements of the Suds Manual (Ciria C753). An extract is presented in Figure 5-11 below..

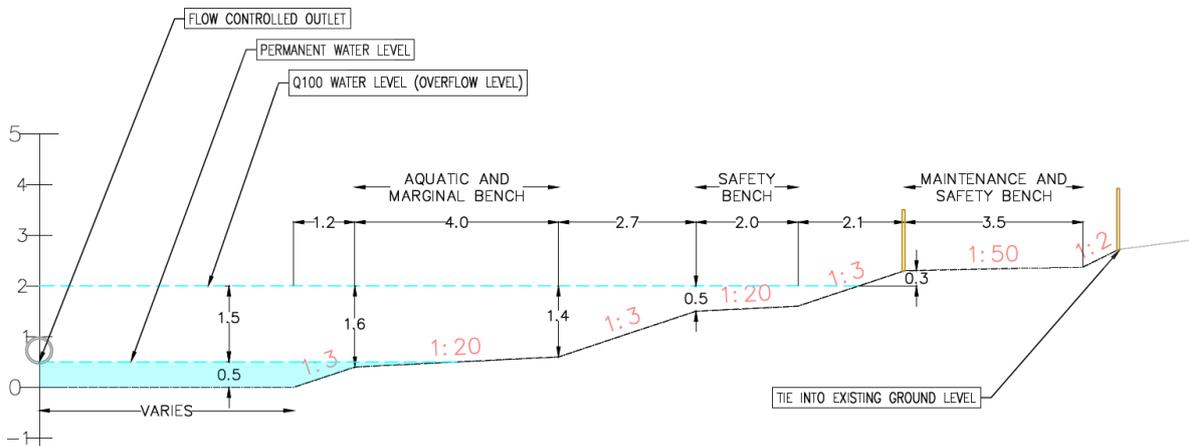


Figure 5-11: Typical Bank Profile

Key aspects which are incorporated into the bank design

- **Maintenance Bench** – A gently sloping bench is to be provided around the perimeter of the pond to facilitate access for maintenance. This is situated above the peak water level. No slopes between the maintenance bench and the permanent pool exceed 1(V) to 3(H). The maintenance bench may be used as a pedestrian path where appropriate

- Safety bench - Below the maintenance bench another safety bench is provided where peak water levels would not exceed 0.5m
- Aquatic and Marginal Bench - This is the zone of shallow water along the edge of the permanent pool that supports wetland planting, acting as a biological filter. This also represents a clearly visible edge to the permanent pond and would tend to be boggy and discourage access to the permanent pond
- Forebay – In larger ponds a berm will be provided across the permanent pond to create a forebay. This will allow coarse sediments to settle in the forebay before the runoff enters the permanent pool.
- Permanent Depth – A typical depth of 500mm will be provided below the outlet to create a permanent pond volume
- Attenuation Storage – The maximum depth of attenuation for the 100 year event is to be 1.5m above the permanent water level. A controlled overflow will be placed above this level
- Freeboard – A minimum 300mm freeboard is provided above the design top water level and the crest of the maintenance bench

Ponds will also have a permanent “treatment volume”. The concept of Treatment Storage is to provide a body of water in which dilution and partial treatment (by physical, chemical and biological means) of the road runoff can take place.

At detailed design phase a comprehensive planting and landscaping plan will be determined for the ponds with the aim of maximising the amenity & biodiversity of the ponds.

Pond treatments will have input from a multidisciplinary team including landscape architect, ecologist, & engineering professionals to implement a best practice design.

DLRCC parks department will also be consulted to ensure a coordinated approach to delivering high quality open space in the area.

5.3 Construction

This section outlines significant factors affecting the construction phase of the Glenamuck District Roads Scheme. Construction of the scheme is dependent on planning approval. Detailed construction information and methodologies will not be available until appointment of a main contractor however the following sections provide general approach and considerations.

5.3.1 Potential Form of Contract

It is anticipated that following the successful attainment of planning permission the scheme would progress to detailed design with the current design team maintained to ensure continuity of the knowledge of the scheme and planning/landowner requirements. On completion of detailed design it is envisaged that the construction of the scheme will be tendered under a "Public Works Contract for Civil Engineering Works Designed by the Employer" contract.

5.3.2 Duration of the Works

Following award of the Tender to the successful contractor it is anticipated that the construction duration for the scheme would be approximately 18-24 months. It is anticipated that the scheme would be progressed as a single construction contract. Once appointed the main Contractor shall be required to provide a detailed programme prior to commencement of the works. This shall set out:

- The overall programme of construction;
- Programming of the key elements and phases of construction;
- Programming of environmental mitigation and monitoring; and
- The duration of each element and phase

5.3.3 Hours of Working

Normal working times will be 07:00 to 19:00hrs Monday to Saturday. Works other than emergency works, pumping out of excavations and security activities will not be undertaken outside these working hours without the written permission of the Contracting Authority.

5.3.4 Pre -Construction works

Pre-construction works may involve diversion of existing services by utility providers however the majority of diversions would be progressed during the main construction works. It is anticipated that a fencing contract to delineate the temporary scheme extents would be carried out. Advance tree and hedgerow clearance and clearance of any invasive plant species is also likely to be carried out subject to environmental mitigation set out in complementary chapters. It is also anticipated that some advance archaeological testing and site investigation works would be completed

5.3.5 Construction Works

An overview of the main construction works is set out below which will be further developed as part of contract documentation for the scheme post planning. All works are to be in accordance with the mitigation measures set out in complementary chapters and in accordance with best practice and contract documentation. Preliminary material quantities are provided in Chapter 13 Land and Soils.

- Fencing of construction areas and establishment of site compound(s)

- Traffic management measures
- Creation of construction stage surface water management measures
- Stripping of topsoil from the road corridor as required by construction phasing. All stripped topsoil to be stockpiled on site for re-use with excess removed off-site.
- Earthworks to road formation level, will involve excavation of on site materials and placement of either excavated or imported material to form road profile. Will also involve export of unsuitable/surplus materials and import of road capping gravels.
- Construction of watercourse crossing structures (culverts/bridge)
- Excavations and surplus soil export for surface water attenuation ponds
- Installation of services and service diversions. Trenching and laying works for all services including ducting, watermains and drainage.
- Import, placement and compaction of pavement foundation gravels, concrete surfaces and kerbs and bituminous surfacing
- Environmental mitigation such as mammal pass structures, noise barriers and compensation planting.
- Ancillary roadworks such as placing signage, public lighting, road markings & traffic signals
- Accommodation works for affected properties such as access roads, fences gates, walls.
- Landscaping of verges, slopes and ponds. Placement of trees, scrubs, surfacing, soils seeding etc. Construction of permanent boundary treatments

5.3.6 Temporary Traffic Management

The scheme shall be constructed in a manner to minimise disruption to road users, local residents and businesses. Prior to the commencement of works the contractor will be required to prepare and submit a detailed site specific traffic management plan to be agreed with DLRCC and the appropriate emergency services. Key considerations to be included in the traffic management plan include

- All construction works to be undertaken in a clearly delineated site area which will have specific entry and exit points for construction traffic
- Local roads to be maintained as minimum 1 way alternating traffic during works with the exception of short term closures for critical works. 2 way traffic flow to be achieved where practicable with durations of one way systems to be minimised
- In particular closures of the Glenamuck road are to be minimised given the traffic flows conveyed and distance of diversion routes prior to the delivery of the GDDR.
- Phasing of construction is to be staggered to minimise works on separate local roads coinciding.

- In order to minimise the impact on local residents, landowners and the public, access to existing residential areas, premises and sports facilities must be maintained during construction with the exception of short term closures for critical works. In particular temporary measures will be required to facilitate access to Wayside Celtic, Bective Rangers and DLRCC traveller accommodation. Contractor to liaise with affected parties to establish usage pattern of affected parties and schedule construction activities accordingly
- Temporary diversion routes may be required to facilitate construction works on local roads without road closures
- All temporary diversions, lane closures, one way systems, signage and temporary safety measures to be on accordance with the Traffic Signs Manual

5.3.7 Construction Compounds

Temporary construction compound space will be required to provide stores, offices, material storage, parking and welfare facilities for the contractor and employers representatives. The exact location layout and size of the compound(s) will be at the discretion of the contractor with the agreement of DLRCC. It is initially envisioned to have two construction compounds at the indicative locations shown in Figure 5-12.

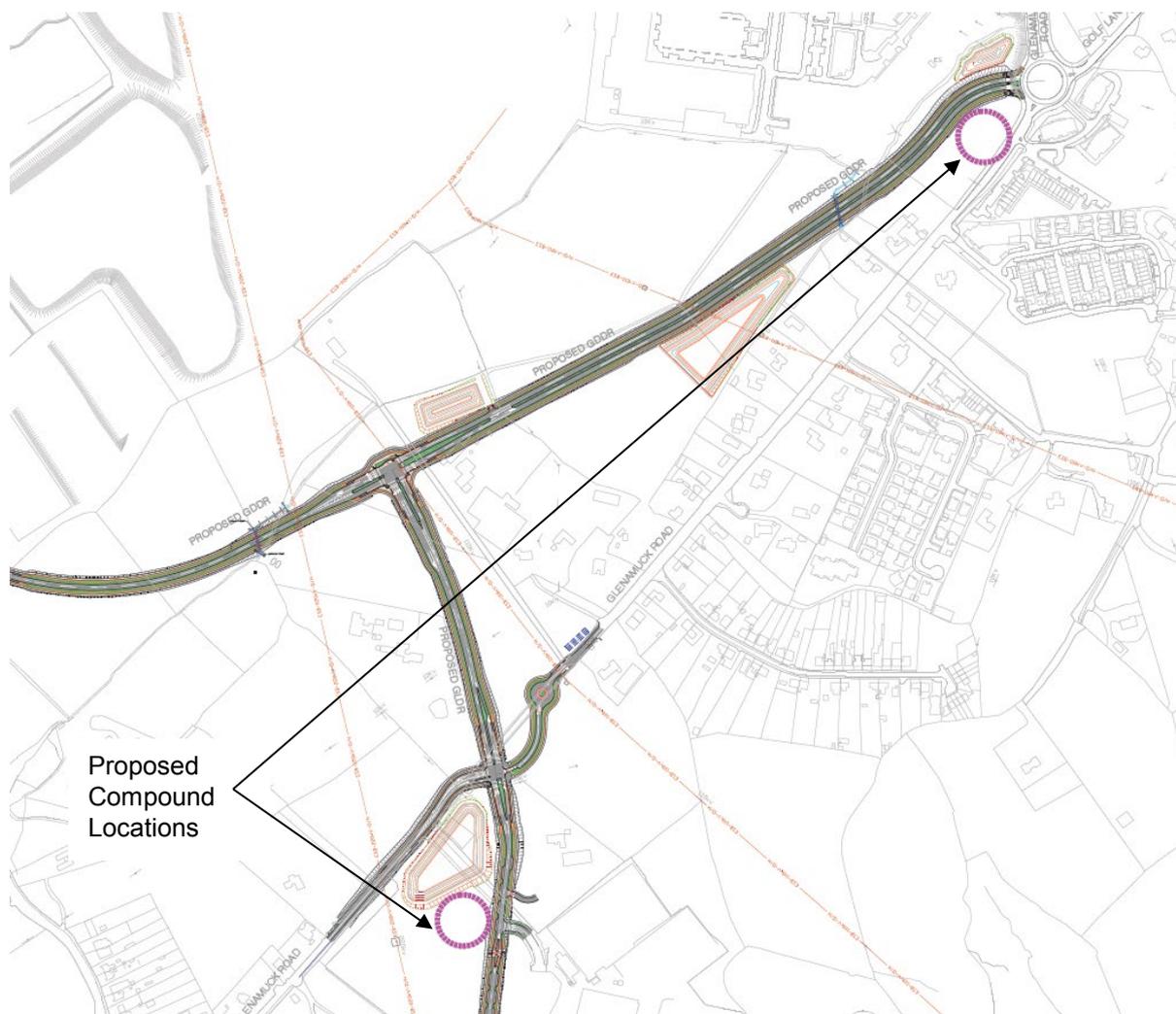


Figure 5-12: Indicative Compound Locations

The compound locations shown provide convenient access from the key arterial M50 route. The locations are staggered north and south of Glenamuck Road allowing access from compounds to northern and southern portions of the scheme separately without requiring construction plant crossings of Glenamuck Road. Any compound locations chosen will be required to be within the identified land take and be compliant with EIAR mitigation measures and agreed construction management documents.

Following completion of construction these areas will be cleared and reinstated and all construction materials will be removed.

5.3.8 Construction Traffic Routing

To construct the scheme there will be a requirement for significant import /export of materials from the site in addition to movement of material within the site extents. Construction and delivery routes and all exit /entry points should clearly be delineated and be specified within the traffic management plan.

In general construction traffic should use public arterial routes suitable for heavy goods traffic for deliveries to/from the site. Within the vicinity of the site, haul routes should be formed along the

proposed road routes to facilitate material movements around the site without affecting local routes. Use of onsite haul routes to be prioritised over use of public roads to minimise disruption to local traffic. Temporary crossing points will be required at any points where construction traffic will cross existing roads. Construction traffic should not use Barnaslingan Lane with the exception of necessary works on the lane as the width and alignment of this road is not suitable for use by heavy construction traffic

Suitable traffic management measures will be required at exit/entry points and at crossing points in accordance with the agreed traffic management plan, the Traffic Signs Manual and the Safety, Health and Welfare at Work (Construction) Regulations.

5.3.9 Construction Management Plan

Prior to any demolition, excavation or construction, a Construction Management Plan (CMP) will be produced by the successful contractor to detail how the project is to be executed in accordance with all project, statutory and environmental requirements. The CMP should detail at a minimum;

- Working hours and days and construction schedule;
- Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);
- Details of construction plant storage, chemical and fuel storage, temporary toilet
- Traffic management plan (to be developed in conjunction with the Local Authority Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements;
- Site Compound locations & layouts.
- Erosion and Sediment Control Plan for surface water runoff and in stream works
- Truck wheel wash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance (demolition & construction);
- Noise and vibration management to prevent nuisance (demolition & construction);
- Landscape management;
- Stockpile locations;
- Temporary hoarding & lighting plans;
- Method Statements for diversion of services;

- Method Statements for Construction of pipelines;
- Method Statements for Storage, Treatment and transport of soft soils;

The production of the CMP will also detail areas of concern with regard to Health and Safety and any environmental issues that require attention during the construction phase.

5.3.10 Environmental Operating Plan

In order to facilitate the integration of environmental issues into road scheme planning, construction and operation, an Environmental Operating Plan (EOP) shall be produced implemented and maintained by the contractor. This represents a best practice guide for considering the environment for the construction life cycle of a road scheme project.

The EOP shall be designed to assist the main contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase. To achieve this objective the EOP shall:

- Comprehensively incorporate all Environmental Commitments set out in the Contract documents, Planning Documents (including EIAR), any conditions and/or modifications imposed by An Bord Pleanála or the local authority
- Provide a method of documenting compliance with these Environmental Commitments and conditions/modifications;
- Itemise relevant environmental legislative requirements and best practice guidance. The EOP should also provide a method of documenting compliance with these requirements, and
- Outline methods by which construction work will be managed to prevent, reduce or compensate for potential adverse impacts on the environment
- Incorporate procedures for communicating with the public, statutory consultees, local authority and relevant site-personnel;
- Incorporate procedures for Environmental Awareness Training for the main contractor's staff;
- Incorporate monitoring procedures and responses to monitoring results, where contractually required, and
- Provide for a system of audit with regard to the effectiveness of the EOP during the construction life cycle of the project.
- Include an Emergency Response Plan (ERP) detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes, fires or flood events.

TII have published "Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan" which should be used as a basis for the creation of the EOP.

The EOP shall be co-ordinated with all other environmental procedural documents required which may include a Construction Management Plan, Erosion and Sediment Control Plan, and a Pollution Prevention Plan.

5.4 References

- EPA (2017) Draft Guidelines on preparation of Environmental Impact Assessment Reports;
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- National Roads Authority (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide (Transport Infrastructure Ireland (TII), (formerly));
- TII (2004) Environmental Assessment and Construction Guidelines;
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements;
- EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- EPA (2015) Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements;
- EPA (2015) Draft Revised Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- EPA (2015) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- EPA (2017) Draft Guidelines on preparation of Environmental Impact Assessment Reports;
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- National Roads Authority (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide (Transport Infrastructure Ireland (TII), (formerly));
- TII (2004) Environmental Assessment and Construction Guidelines;
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements;
- EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- EPA (2015) Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements;
- EPA (2015) Draft Revised Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- EPA (2015) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Design Manual for Urban Roads & Streets (DMURS) by the Department of the Environment, Community and Local Government/Department of Transport, Tourism and Sport, 2013;
- Dún Laoghaire-Rathdown County Council (2013) Kiltiernan/Glenamuck Local Area Plan; and
- Dún Laoghaire-Rathdown County Council (2007). Kiltiernan/Glenamuck Local Area Plan.